JACC Vol. 58, No. 7, 2011
August 9, 2011:775–8

Letters to the Editor

Limitations of Gait Speed as an Independent Predictor of Mortality and Morbidity in Cardiac Patients

Afilalo et al. (1) report that an impaired gait speed (a simple measure of frailty) can be used to identify elderly patients at high risk of major in-hospital events after cardiac surgery. They defined the primary predictor slow gait speed as the time taken to walk 5 m in more than 6 s.

Gait speed is already an established marker of exercise capacity in the elderly (2), and thus the results of the study are not surprising. The overwhelming amount of previous studies including statements of consensus definitions for sarcopenia and cachexia in elderly and in chronically ill patients defines slow gait speed as a walking speed <0.8 m/s on the 4-m walk test (3,4). We thus were surprised to see that Afilalo et al. (1) used a different definition of slow gait speed and suggest using a 5-m walk test. For the 4-m gait speed test, a very large body of population-based data and normal values are available (from investigations in many thousands of subjects [4]). To reinvent the wheel may sometimes be a good idea, but it seems that this is not such an occasion, particularly not if we want our studies to be accepted outside of cardiology by general medicine and geriatrics; after all many of our patients are elderly. Afilalo et al. (1) suggest that a time of <6 s to walk 5 m is "normal" (i.e., >0.833 m/s), but where is the evidence of this? This small study with 131 patients cannot establish "normality." Very large population-based studies found a cutoff of 0.8 m/s (3). We in cardiology should use these cutoffs as well, at least until we have proved that they are not useful in our patients (which seems doubtful). We suggest focusing on the use of the previous and established definition for the 4-m walk test in future trials. This would allow better comparability between previous, ongoing, and future studies in the field of frailty, sarcopenia, and/or cachexia in patients with heart disease as well as other chronic illnesses.

Regarding the survival analysis, we only want to state that according to their Table 1, it appears that many important parameters known to affect prognosis of such patients (including anemia, estimated glomerular filtration rate, body temperature, and plasma levels of natriuretic peptides) were not considered. Hence, we find the statement that gait speed (regardless of how it is measured) is an "incremental predictor of mortality and major morbidity" in elderly patients undergoing cardiac surgery too broad and likely wrong in selected patients. We believe that the value of using slow gait speed as a reliable marker for surgical or other outcomes in patients with cardiac illness still needs to be better defined.

***Thomas Thum, MD, PhD**
Stefan von Haehling, MD, PhD
Stefan D. Anker, MD, PhD

*Molecular and Translational Therapeutic Strategies
Hannover Medical School
Carl-Neuberg-Str. 1
Hannover, Lower Saxony 30625
Germany
E-mail: thum.thomas@mh-hannover.de

doi:10.1016/j.jacc.2010.11.080

REFERENCES

1. Afilalo J, Eisenberg MJ, Morin JF, et al. Gait speed as an incremental predictor of mortality and major morbidity in elderly patients undergoing cardiac surgery. J Am Coll Cardiol 2010;56:1668–76.
2. Buchner DM, Larson EB, Wagner EH, Koepsell TD, de Lateur BJ. Evidence for a non-linear relationship between leg strength and gait speed. Age Ageing 1996;25:386–91.
3. Muscaritoli M, Anker SD, Argilés J, et al. Consensus definition of sarcopenia, cachexia and pre-cachexia: joint document elaborated by Special Interest Groups (SIG) "cachexia-anorexia in chronic wasting diseases" and "nutrition in geriatrics." Clin Nutr 2010;29:154–9.
4. Abellan van Kan G, Rolland Y, Andrieu S, Bauer J, et al. Gait speed at usual pace as a predictor of adverse outcomes in community-dwelling older people an International Academy on Nutrition and Aging (IANA) Task Force. J Nutr Health Aging 2009;13:881–9.

Reply

We appreciate the interest of Dr. Thum and colleagues in our prospective study of gait speed in elderly patients undergoing cardiac surgery (1). Two points are raised: the first concerns the validity of the gait speed protocol used, and the second concerns the selection of the covariates evaluated in the multivariable model.

First, the gait speed protocol used in this study was prespecified to be a 5-m distance with a cutoff fit to optimally predict the occurrence of mortality or major morbidity in our patient population (which was 6 s [0.83 m/s] as determined by receiver-operating characteristic analysis). Dr. Thum and colleagues suggest that this distance and cutoff are not consistent with consensus definitions. We respectfully disagree and point to the recent task force position statement on gait speed that highlights a variety of distances and cutoffs appropriately used in the medical literature (2). Accordingly, the most common distances were between 4 and 6 m, and the most common cutoffs were between 0.6 and 1.0 m/s, depending on the patient population being evaluated and the outcome being predicted. The task force authors go on to state that "the use of gait speed at usual pace as a predictor makes the course-distance of less importance." In keeping with this, Graham et al. (3) demonstrated that course distance was not a significant determinant of mean gait speed. Therefore, although a 4-m, 0.8-m/s protocol is endorsed by some, there remains justified variability and the 5-m, 6-s protocol used in this study is entirely within evidence-based standards. Moreover, we find it important to correct that short-distance gait speed is not intended to be a marker of exercise capacity nor of sarcopenia and cachexia, as suggested, but rather a marker of frailty, which is regarded as a distinct entity.

Second, the covariates evaluated in the multivariable model were prespecified to be the Society of Thoracic Surgeons predicted

risk of mortality or major morbidity and a group of 7 individual risk factors that had been shown to account for the bulk of the outcomes observed. It is undoubtedly true that other risk factors exist; however, the benefit of adding covariates in a statistical model must be weighed against the risk of overfitting and detecting spurious associations (4). In light of this, we, like many others, opted for a parsimonious model containing core risk factors rather than exhaustive ones.

Good clinical practice dictates that the incorporation of new tests and treatments should be based on sound evidence, ideally from more than a single study. As stated in our paper, we wholeheartedly endorse and look forward to future efforts to study the optimal cutoff for slow gait speed and to validate the role of gait speed as a prognostic marker in patients undergoing cardiac surgery.

***Jonathan Afilalo, MD, MSc**
Mark J. Eisenberg, MD, MPH
Howard Bergman, MD
Johanne Monette, MD, MSc
Jean-Francois Morin, MD
Yves Langlois, MD
Nicolas Noiseux, MD
Louis P. Perrault, MD, PhD
Karen P. Alexander, MD

*Division of Cardiology
Sir Mortimer B. Davis Jewish General Hospital
McGill University
3755 Cote Ste Catherine
Montreal, QC H3T 1E2
Canada
E-mail: jonathan@afilalo.com

doi:10.1016/j.jacc.2011.01.064

REFERENCES

1. Afilalo J, Eisenberg MJ, Morin JF, et al. Gait speed as an incremental predictor of mortality and major morbidity in elderly patients undergoing cardiac surgery. J Am Coll Cardiol 2010;56:1668–76.
2. Abellan van Kan G, Rolland Y, Andrieu S, et al. Gait speed at usual pace as a predictor of adverse outcomes in community-dwelling older people an International Academy on Nutrition and Aging (IANA) Task Force. J Nutr Health Aging 2009;13:881–9.
3. Graham J, Ostir G, Kuo Y, Fisher S, Ottenbacher K. Relationship between test methodology and mean velocity in timed walk tests: a review. Arch Phys Med Rehabil 2008;89:865–72.
4. Peduzzi P, Concato J, Feinstein AR, Holford TR. Importance of events per independent variable in proportional hazards regression analysis II. Accuracy and precision of regression estimates. J Clin Epidemiol 1995;48:1503–10.

Valve Academic Research Consortium Consensus Report

The Pharmaceutical and Medical Devices Agency Perspective

First, we sincerely express our appreciation for the organized effort by the Valve Academic Research Consortium (VARC) members (1). Similar to the United States, there is no approved transcatheter aortic valve implantation (TAVI) device in Japan at present. We believe that this VARC consensus report is beneficial, even for the Pharmaceutical and Medical Devices Agency (PMDA), which is the regulatory authority in Japan.

Although we believe that the consensus is already well organized, we comment here on several points from the PMDA perspective.

1. The definition of intended performance of the prosthetic heart valve. Considering implantation in smaller body size, such as in Asian patients, or future possible expansion of the size variation of TAVI device, the critical value of 1.2 cm^2 for the aortic valve area may need some adjustment based on patient body size or device size.
2. Hospitalization criteria variance among countries. We bring to your attention that there will be a possible bias by each country's medical care setting. For example, the threshold of hospitalization would be lower in Japan than in United States or the European Union.
3. Evaluation of stroke. The consensus proposed the modified Rankin Scale (mRS) score at 30 and 90 days for the stroke definition. We suggest that National Institutes of Health Stroke Scale (NIHSS) should also be used, and the time point of the evaluations should cover event onset (acute phase) as well, first, because generally the mRS score would be appropriate for the relatively chronic phase and NIHSS would be more appropriate for the acute phase and, second, because immediate treatment of stroke will greatly influence the mRS score at 30 and 90 days, and its evaluation would not properly reflect the impact as a TAVI complication. In addition, the NIHSS was proposed in U.S. Food and Drug Administration guidelines (2) in 2007 for a neurothrombectomy device and used in many clinical studies for cerebrovascular disorders.

We hope that our comments contribute to honing the criteria consensus further.

Koji Ikeda, PhD
Mami Ho, MD, PhD
***Masayuki Kawahara, MD**

*Office of Medical Devices
Pharmaceutical and Medical Devices Agency
Shin-kasumigaseki Building
3-3-2, Kasumigaseki
Chiyoda-ku, Tokyo
Japan
E-mail: kawahara-masayuki@pmda.go.jp

doi:10.1016/j.jacc.2011.02.070

REFERENCES

1. Leon MB, Piazza N, Nikolsky E, et al. Standardized endpoint definitions for transcatheter aortic valve implantation clinical trials: a consensus report from the Valve Academic Research Consortium. J Am Coll Cardiol 2011;57:253–69.
2. FDA: Pre-Clinical and Clinical Studies for Neurothrombectomy Devices Guidance for Industry and FDA Staff, 2007.